

1. (Currently Amended) Surgical eversion apparatus for preparing a conduit for anastomosis in a human patient using a device with multiple piercing members, said eversion apparatus comprising an evertng member having a loop shaped portion adapted to be inserted into an end portion of a conduit from a human patient and configured to fold a portion of the conduit over itself when it is moved away [[for]] from the conduit end portion and along the conduit while a portion of the conduit is held fixed relative thereto.
2. (Previously Presented) The eversion apparatus of claim 1 wherein said evertng apparatus includes a handle and said evertng member is coupled to said handle.
3. (Previously Presented) The eversion apparatus of claim 2 wherein said evertng member comprises a flexible member having two ends, said two ends being movable relative to said handle and portions of said flexible member being slidably mounted to said handle.
4. (Previously Presented) The eversion apparatus of claim 2 wherein said evertng member comprises a flexible member having two ends, one of said ends being movable relative to said handle, the other one of said two ends being fixedly secured to said handle.
5. (Previously Presented) The eversion apparatus of claim 2 wherein said evertng member comprises a flexible member having two ends, both of said ends being fixedly attached to said handle.
6. (Previously Presented) The eversion apparatus of any one of claims 3-5 wherein said flexible member comprises a pliable wire.
7. (Previously Presented) The eversion apparatus of claim 1 wherein said loop shaped portion has an adjustable diameter.

8. (Previously Presented) A vessel eversion system for preparing a vessel for anastomosis in a human patient, said vessel eversion system comprising: a vessel support device having a proximal end and a distal end; and evertng apparatus comprising an evertng member, said evertng member having a loop shaped portion adapted to be inserted into a portion of a vessel to be prepared for an anastomosis in a human patient and evert the portion of the vessel over said vessel support device when said vessel is coupled to said support device with an end portion thereof extending from said distal end of said support device.

9. (Previously Presented) The vessel eversion system of claim 8 wherein said evertng apparatus includes a handle and said evertng member is coupled to said handle.

10. (Previously Presented) The vessel eversion system of claim 9 wherein said evertng member comprises a flexible member having two ends, said two ends being movable relative to said handle and portions of said flexible member being slidably mounted to said handle.

11. (Previously Presented) The vessel eversion system of claim 9 wherein said evertng member comprises a flexible member having two ends, one of said ends being movable relative to said handle, the other one of said two ends being fixedly secured to said handle.

12. (Previously Presented) The vessel eversion system of claim 9 wherein said evertng member comprises a flexible member having two ends, both of said ends being fixedly attached to said handle.

13. (Previously Presented) The vessel eversion system of any one of claims 10-12 wherein said flexible member comprises a pliable wire.

14. (Previously Presented) The vessel eversion system of claim 8 wherein said loop shaped portion has an adjustable diameter.

WHAT IS CLAIMED IS:

1. Surgical connection apparatus comprising:
  - a support structure;
  - a plurality of self-closing clips, each clip being releasably coupled to said support structure; and
    - a plurality of barbs, each barb being coupled to said support structure, said barbs being separate from said clips, which are ejectable from said support structure independently of said barbs.
2. The apparatus of claim 1 wherein said support structure comprises a plurality of members, each clip being releasably coupled to one of said plurality of members.
3. The apparatus of claim 2 wherein each of said plurality of members comprises a tubular member and each clip is slidably disposed in a tubular member.
4. The apparatus of 3 further including a plunger movably coupled to said support structure and a pusher disposed in each of said plurality of members, each pusher having a proximal end being secured to said plunger and a distal end portion coupled to a respective clip so that movement of said plunger moves all of said clips therewith.
5. The apparatus of 4 wherein each clip has a memory set closed configuration, when said clips are disposed in said tubular members each tubular member biases a respective clip away from said closed configuration, and when said clips are released from said tubular members said clips move toward their memory set closed configuration.
6. The apparatus of any one of claims 1-3 further including means for simultaneously deploying said clips.
7. The apparatus of any one of claims 1-5 wherein said barbs are slidably coupled to said support structure.
8. The apparatus of claim 1 wherein said support structure comprises a first plurality of members, each clip being releasably coupled to one of said first plurality of members, and a second plurality of members, each barb being slidably coupled to one of said second plurality of members.

9. The apparatus of claim 8 wherein each of said first and second plurality of members comprises a tubular member and each of said clips and barbs are slidably disposed in a respective tubular member.
10. The apparatus of 9 further including a plunger movably coupled to said support structure and a pusher disposed in each of said first plurality of members, each pusher having a proximal end being secured to said plunger and a distal end portion coupled to a respective clip so that movement of said plunger moves all of said clips therewith.
11. The apparatus of claim 10 further including a second plunger movably coupled to said support structure, each barb having a distal end and a proximal end, said second plunger being coupled to each barb proximal end so that said second plunger moves all of said barbs therewith.
12. The apparatus of claims 10 or 11 wherein each clip has a memory set closed configuration, when said clips are disposed in said first plurality of tubular members each tubular member biases a respective clip away from said closed configuration, and when said clips are released from said tubular members said clips move toward their memory set closed configuration.
13. The apparatus of claims 10 or 11 wherein each barb has a distal portion with a memory set hook configuration, when said barb distal end portions are disposed in said second plurality of tubular members each tubular member biases a respective barb distal end portion away from said hook configuration, and when said barb distal end portions are extended away from said tubular members said barbs move toward their memory set hook configuration.
14. The apparatus of claims 8 or 9 further including means for simultaneously deploying said clips.
15. The apparatus of claims 8 or 9 further including means for simultaneously deploying said barbs.
16. The apparatus of claims 8 or 9 further including means for simultaneously deploying said clips and means for simultaneously deploying said barbs independently of said clips.
17. Surgical connection apparatus comprising:

a support structure forming a first plurality of paths and a second plurality of paths;

a plurality of clips, each clip being slidably disposed in one path of said first plurality of paths; and

a plurality of barbs, each barb being slidably disposed in one path of said second plurality of paths.

18. The anastomosis apparatus of claim 17 wherein said clips are separate from and barbs and are movable independently of said barbs.

19. The apparatus of claim 17 further including a plunger movably coupled to said support structure and a pusher disposed in each of said first plurality of paths, each pusher having a proximal end being secured to said plunger and a distal end portion coupled to a respective clip so that movement of said plunger moves all of said clips therewith.

20. The apparatus of claim 19 further including a second plunger movably coupled to said support structure, each barb having a distal end and a proximal end, said second plunger being coupled to each barb proximal end so that said second plunger moves all of said barbs therewith.

21. The apparatus of claim 20 wherein said plungers are independently movable.

22. Surgical connection apparatus for connecting a first structure to a second structure, said connection apparatus comprising a support structure, a plurality of barbs coupled to said support structure, a plurality of clips being slidably coupled to said support structure and unattached to said barbs; means for moving said barbs; and means for ejecting said clips from said support structure.

23. The apparatus of claim 22 wherein said clips comprise shape memory material, have a memory set closed configuration, and move toward said closed configuration when ejected from said support structure.

24. The apparatus of claim 23 wherein said clip ejecting means ejects said clips simultaneously.

25. The apparatus of claim 22 wherein said clip ejecting means ejects said clips simultaneously.

26. The apparatus of claim 25 wherein said barb moving means provides means for extending the barbs from said support structure and retracting the barbs into said support structure.
27. The apparatus of any one of claims 24-26 wherein said barb moving means moves said barbs simultaneously.
28. Surgical connection apparatus for connecting a first structure to a second structure, said connection apparatus comprising a support structure, a plurality of barbs coupled to said support structure, a plurality of clips being slidably coupled to said support structure and unattached to said barbs; and means for simultaneously ejecting said plurality of clips.
29. The apparatus of claim 28 wherein said clips comprise shape memory material, have a memory set closed configuration, and move toward said memory set closed configuration when ejected from said support structure.
30. The apparatus of claim 28 further including means for moving said barbs between a first position where they extend from said support structure and a second position where they are retracted into said support structure.
31. Surgical connection apparatus for connecting a first structure to a second structure, said connection apparatus comprising a support structure, a plurality of barbs, each coupled to said support structure and having a distal end portion, a plurality of clips slidably coupled to said support structure, means for moving said barbs between a first position where said distal end portions are inside said support structure to a second position where said distal end portions extend from said support structure; and means for ejecting said clips from said support structure.
32. The apparatus of claim 31 wherein said ejecting means provides means for ejecting said clips simultaneously.
33. The apparatus of claims 31 or 32 wherein said barb moving means moves said barbs simultaneously.
34. A method of performing an anastomosis comprising:  
everting a tubular graft structure over a support structure and passing a plurality of barbs from the support structure into the graft to secure the graft to the support

64. (Original) A method for performing an anastomosis while maintaining blood flow within a vessel comprising: positioning a cannula so that it extends through a vessel wall; attaching a graft to the vessel wall adjacent to said cannula while said cannula extends through said vessel wall; and removing the cannula.
65. (Original) The method of claim 64 wherein the cannula is positioned in the vessel wall from the interior of the vessel.
66. (Original) A method for performing an anastomosis on a vessel wall while maintaining blood flow within the vessel comprising: forming an opening in the blood vessel; inserting an occluding member into the opening cut into the vessel, thereby occluding the opening; and anastomosing a graft to the vessel at the opening.
67. (Original) The method of claim 66, wherein said forming an opening comprises: piercing the vessel wall with an anchor member; and cutting the opening in the vessel wall around the anchor member with a cutting tool.
68. (Original) The method of claim 67, further comprising removing a tissue plug produced by said cutting, prior to said inserting an occluding member.
69. (Original) The method of claim 67, wherein said inserting comprises inserting the occluding member into the opening cut into the vessel while the cutting tool is still in the opening.
70. (Original) The method of claim 69, further comprising withdrawing the cutting tool to allow the occluding member to expand against the periphery of the opening, thereby occluding it.

71. (Original) The method of claim 70, further comprising placing a graft over the occluding member and in alignment with the opening, prior to said anastomosing.
72. (Original) The method of claim 67, further comprising sliding a generally circular centering disk along the anchor member onto the vessel wall, prior to said cutting, thereby clamping vessel wall tissue between the centering disk and an end portion of the anchoring member.
73. (Original) The method of claim 72, further comprising removing the tissue plug in a clamped configuration between the centering disk and anchoring member.
74. (Original) The method of claim 66, wherein said anastomosing comprises fastening walls of the graft and vessel together using fasteners.
75. (Original) The method of claim 74, wherein said fastening is performed with self closing fasteners.
76. (Original) The method of claim 66, wherein the occluding member includes fasteners attached thereto, said method further comprising pulling back said occluding member slightly, after expanding to occlude, thereby piercing the vessel wall with needles attached to said fasteners.
77. (Original) The method of claim 76, further comprising grasping the needles and pulling them entirely through the vessel wall, thereby positioning the fasteners for performing the anastomosis and separating them from the occluding member.
78. (Original) The method of claim 77, wherein the fasteners each have a second needle at an end opposite the location of the needles used to pierce the vessel wall, said anastomosing further comprising piercing the graft with the second needles and securing the graft and the vessel together by closing the fasteners upon them.

79. (Original) The method of claim 67, wherein an adapter is mounted on the cutting tool, the adapter retaining a plurality of needles therein which are prepositioned for piercing the vessel from the inside out, said method further comprising inserting the cutting tool and adapter into the vessel, prior to said inserting an occluding member, so as to position the needles against the inner wall of the vessel, and pulling back the adapter and cutting tool slightly to pierce the vessel wall with the needles; grasping the needles and pulling them all the way through the vessel and thereby also removing them from the adapter.
80. (Original) The method of claim 79, wherein the needles are connected to two-stage release fasteners having independently closable first and second portions, the needles being connected by flexible members to respective first portions of the fasteners, said method further comprising removing the needles and flexible members from the fasteners, after insertion of the occluding member, thereby closing the first portions of the fasteners and fixing the fasteners to the wall of the vessel.
81. (Original) The method of claim 80, wherein the fasteners each have a second needle connected to an end portion of the second portion thereof by a second flexible member, said anastomosing further comprising piercing the graft with the second needles and securing the graft and the vessel together by removing the second needles and second flexible members from the second portions of the fasteners, thereby closing the second portions of the fasteners on the graft and fixing the walls of the vessel and the graft in approximation.

17. A clip assembly comprising:

two clips each having two end points which are separated from each other when said clips are in an open configuration and tending to return to a naturally closed configuration by reducing distance between said end points when the clip is in said open configuration;

two tissue penetrating needles each connected to one of said two end points of a corresponding one of said two clips through a flexible member; and

a flexible connector connecting the other end points of said two clips together.

18. The clip assembly of claim 17 further comprising releasing means for normally keeping said two clips in said open configuration and releasing each of said two clips to become separated from the associated flexible member to thereby allow said clips to begin returning to said closed configuration.

19. The clip assembly of claim 17 wherein said clips comprise a wire made of a shape memory material.

20. A minimally invasive method of holding two tissue parts together, said method comprising the steps of:

providing a clip assembly which comprises two clips each having two end points which are separated from each other when said clips are in an open configuration and tending to return to a naturally closed configuration by reducing distance between said end points when the clip is in said open configuration, two tissue penetrating needles each connected to one of said two end points of a corresponding one of said two clips through a flexible member, and a flexible connector connecting the other end points of said two clips together;

penetrating and completely pulling one of the needles through a tissue part and penetrating and completely pulling the other of the needles through an adjacent tissue part while said clips are each in said open configuration;

pulling the needles until each of said clips is hooked to a corresponding one of the tissue parts; and

allowing said clips to start to return to said naturally closed configuration, whereby said two tissue parts are held together by said flexible connector stretched between said clips.

21. The method of claim 20 wherein said clip assembly further comprises releasing means for normally keeping said two clips in said open configuration and releasing each of said two clips to become separated from the associated flexible member to thereby allow said clips to begin returning to said closed configuration, and wherein said clips are allowed to start to return to said naturally closing configuration by separating said clips from said needles through said releasing means.

22. The method of claim 20 wherein said clips comprise a wire made of a shape memory material.

WHAT IS CLAIMED IS:

1. Surgical connection apparatus comprising:
  - a tubular needle having a proximal portion and a distal portion with a pointed distal end, said tubular needle forming a pathway between said proximal and distal portions;
  - a plurality of self-closing clips, each clip being slidably disposed in said pathway; and
  - a pusher having a portion arranged to slidably move in said pathway and push said clips in a distal direction.
2. The apparatus of claim 1 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.
3. The apparatus of claim 2 wherein both of said ends of each clip are rounded.
4. The apparatus of claim 1 further including a stop member extending from said distal portion of said tubular needle at a location spaced from the distal end of said tubular needle and along said pathway a predetermined distance less than the length of one of said self-closing clips.
5. The apparatus of claim 4 wherein said distance ranges from about 1/8 inch to about 1 inch.
6. The apparatus of claim 1 further including a stop member extending from said distal portion of said tubular needle at a location spaced from the distal end of said tubular needle and along said pathway a distance sufficient to allow gathering on said tubular needle material to be joined.
7. The apparatus of claim 6 wherein said distance ranges from about 1/8 inch to about 1 inch.
8. The apparatus of claim 1 wherein said tubular needle distal portion is curved.
9. The apparatus of claim 1 wherein said tubular needle distal portion has a spiral portion.
10. The apparatus of claim 1 wherein said tubular needle comprises a hypo-needle.

11. The apparatus of claim 10 wherein said hypo-needle has a slot formed therein, said slot extending toward said distal end of said tubular needle and said pusher having a portion extending through said slot.
12. The apparatus of claim 1 wherein said tubular needle has a slot formed therein, said slot extending toward said distal end of said tubular needle and said pusher having a portion extending through said slot.
13. The apparatus of claim 1 wherein each clip has a memory set closed configuration, when said clips are disposed in said tubular needle, said tubular needle biases said clips away from said closed configuration, and when said clips are released from said tubular needle, said clips move toward their memory set closed configuration.
14. The apparatus of claim 13 wherein said clips have a loop shaped memory set closed configuration.
15. The apparatus of claim 1 wherein said clips have a loop shaped memory set closed configuration.
16. Surgical connection apparatus comprising:
  - a support having a distal portion having a distal end and a proximal portion, said support forming a pathway between said proximal and distal portions;
  - a plurality of self-closing clips, each clip being slidably disposed in said pathway;
  - a pusher having a portion arranged to slidably move in said pathway and push said clips in a distal direction; and
  - a stop member extending from said distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance sufficient to allow gathering on said distal portion of said support material to be joined.
17. The apparatus of claim 16 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member and serially arranged.
18. The apparatus of claim 16 wherein said support distal portion is curved.
19. The apparatus of claim 16 wherein said support distal portion has a spiral portion.
20. The apparatus of claim 16 wherein said support member comprises a tubular member and said distal end is pointed.

21. The apparatus of claim 20 wherein said tubular member comprises a hypo-needle.
22. The apparatus of claim 21 wherein said hypo-needle has a slot formed therein, said slot extending toward said distal end of said support and said pusher having a portion extending through said slot.
23. The apparatus of claim 16 wherein said support comprises a tubular member, which forms at least a portion of said pathway, each clip has a memory set closed configuration, when said clips are disposed in said tubular member, said tubular member biases said clips away from said closed configuration, and when said clips are released from said tubular member, said clips move toward their memory set closed configuration.
24. The apparatus of claim 16 wherein said clips have a loop shaped memory set closed configuration.
25. The apparatus of claim 24 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member and serially arranged.
26. The apparatus of claim 16 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.
27. The apparatus of claim 26 wherein both of said ends of each clip are rounded.
28. The apparatus of claim 16 wherein said distance ranges from about 1/8 inch to about 1 inch.
29. Surgical connection apparatus comprising:
  - a support having a distal portion having a distal end and a proximal portion, said support forming a pathway between said proximal and distal portions;
  - a plurality of self-closing clips, each clip being slidably disposed in said pathway;
  - a pusher having a portion arranged to slidably move in said pathway and push said clips in a distal direction; and
  - a stop member extending from said distal portion of said support at a location spaced from the distal end of said support and along said pathway a predetermined distance less than the length of one of said self-closing clips.
30. The apparatus of claim 29 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member and serially arranged.

31. The apparatus of claim 29 wherein said support distal portion is curved.
32. The apparatus of claim 29 wherein said support distal portion has a spiral portion.
33. The apparatus of claim 29 wherein said support comprises a tubular member and said distal end is pointed.
34. The apparatus of claim 33 wherein said tubular member comprises a hypo-needle.
35. The apparatus of claim 34 wherein said hypo-needle has a slot formed therein, said slot extending toward said distal end of said support and said pusher having a portion extending through said slot.
36. The apparatus of claim 29 wherein said support comprises a tubular member, which forms at least a portion of said pathway, each clip has a memory set closed configuration, when said clips are disposed in said tubular member said tubular member biases said clips away from said closed configuration, and when said clips are released from said tubular member said clips move toward their memory set closed configuration.
37. The apparatus of claim 29 wherein said clips have a loop shaped memory set closed configuration.
38. The apparatus of claim 37 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member and serially arranged.
39. The apparatus of claim 29 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.
40. The apparatus of claim 39 wherein both of said ends of each clip are rounded.
41. The apparatus of claim 29 wherein said distance ranges from about 1/8 inch to about 1 inch.
42. Surgical connection apparatus comprising:
  - a support having a distal portion having a distal end and a proximal portion, said support forming a pathway between said proximal and distal portions;
  - a plurality of self-closing clips, each clip being slidably disposed in said pathway; and
  - a pusher having a portion arranged to slidably move in said pathway and push said clips in a distal direction, said pusher having a first state where it is releasably

locked in a first position in said support with one of said clips being in the distal portion of said support and a second state where it is releasably locked in a second position in said support with said one of said clips being partially ejected from said support.

43. The apparatus of claim 42 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member.
44. The apparatus of claim 43 wherein said clips are serially arranged.
45. The apparatus of claim 42 wherein said support distal portion is curved.
46. The apparatus of claim 42 wherein said support distal portion has a spiral portion.
47. The apparatus of claim 42 wherein said support comprises a tubular member and said distal end is pointed.
48. The apparatus of claim 47 wherein said tubular member comprises a hypo-needle.
49. The apparatus of claim 48 wherein said hypo-needle has a slot formed therein, said slot extending toward said distal end of said support and said pusher extending through said slot.
50. The apparatus of claim 49 including a second tubular member surrounding a portion of said support and having a slot formed therein and aligned with said slot in said hypo-needle, said pusher extending through both slots.
51. The apparatus of claim 50 wherein said second tubular member has a plurality of recesses and said pusher has a recess, further including a spring loaded button disposed in said pusher recess and said pusher being movable to align said spring loaded button with said second tubular member recesses.
52. The apparatus of claim 42 wherein each clip has a memory set closed configuration, when said clips are disposed in said tubular member said tubular member biases said clips away from said closed configuration, and when said clips are released from said tubular member said clips move toward their memory set closed configuration.
53. The apparatus of claim 42 wherein said clips have a loop shaped memory set closed configuration.
54. The apparatus of claim 53 wherein said support comprises a tubular member and said self-closing clips are slidably disposed in said tubular member.

55. The apparatus of claim 42 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.
56. The apparatus of claim 55 wherein both of said ends of each clip are rounded.
57. The apparatus of claim 42 further including a stop member extending from said distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance less than the length of one of said self-closing clips.
58. The apparatus of claim 57 wherein said distance ranges from about 1/8 inch to about 1 inch.
59. The apparatus of claim 42 further including a stop member extending from said distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance sufficient to allow gathering on said tubular needle material to be joined.
60. The apparatus of claim 59 wherein said distance ranges from about 1/8 inch to about 1 inch.
61. Surgical connection apparatus comprising:
  - a tubular clip support having a distal portion having a distal end and a proximal portion, said support forming a pathway between said proximal and distal portions, said support having a slot formed therein;
  - a plurality of self-closing clips, each clip being slidably disposed in said pathway;
  - a tubular sleeve surrounding at least a portion of said tubular clip support and having a slot aligned with said slot in said tubular clip support; and
  - a pusher arranged to slidably move in said pathway and push said clips in a distal direction, said pusher extending through said slots.
62. The apparatus of claim 61 further including a stop member extending from said distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance less than the length of one of said self-closing clips.
63. The apparatus of claim 62 wherein said distance ranges from about 1/8 inch to about 1 inch.
64. The apparatus of claim 61 further including a stop member extending from said

distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance sufficient to allow gathering on said tubular needle material to be joined.

65. The apparatus of claim 64 wherein said distance ranges from about 1/8 inch to about 1 inch.

66. The apparatus of claim 61 wherein said pusher has a first state where it is releasably locked in a first position in said support with one of said clips being within the distal portion of said support and a second state where it is releasably locked in a second position in said support with said one of said clips being partially ejected from said support.

67. The apparatus of claim 66 wherein said tubular sleeve has a plurality of recesses and said pusher has a recess, further including a spring loaded button being disposed in said pusher recess and said pusher being movable to align said spring loaded button with said second tubular member recesses.

68. The apparatus of claim 61 wherein said clips are serially aligned.

69. The apparatus of claim 61 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.

70. The apparatus of claim 69 wherein both of said ends of each clip are rounded.

71. The apparatus of any one of claims 61-70 wherein said clip support comprises a tubular member and said distal end is pointed.

72. The apparatus of claim 71 wherein said clip support comprises a hypo-needle.

73. A method of connecting tissue comprising:

penetrating a self-closing clip support through first and second portions of material wherein at least one of said portions comprises tissue;  
extending a portion of a self-closing clip from said clip support; and  
simultaneously withdrawing said clip support from said material and allowing said self-closing clip to be discharged therefrom.

74. A method of connecting tissue comprising:

penetrating a self-closing clip support through first and second portions of material wherein at least one of said portions comprises tissue;  
extending a portion of a self-closing clip, having a memory set closed

distal portion of said support at a location spaced from the distal end of said support and along said pathway a distance sufficient to allow gathering on said tubular needle material to be joined.

65. The apparatus of claim 64 wherein said distance ranges from about 1/8 inch to about 1 inch.
66. The apparatus of claim 61 wherein said pusher has a first state where it is releasably locked in a first position in said support with one of said clips being within the distal portion of said support and a second state where it is releasably locked in a second position in said support with said one of said clips being partially ejected from said support.
67. The apparatus of claim 66 wherein said tubular sleeve has a plurality of recesses and said pusher has a recess, further including a spring loaded button being disposed in said pusher recess and said pusher being movable to align said spring loaded button with said second tubular member recesses.
68. The apparatus of claim 61 wherein said clips are serially aligned.
69. The apparatus of claim 61 wherein each clip has a first end and a second end, at least one of said ends of each clip is rounded.
70. The apparatus of claim 69 wherein both of said ends of each clip are rounded.
71. The apparatus of any one of claims 61-70 wherein said clip support comprises a tubular member and said distal end is pointed.
72. The apparatus of claim 71 wherein said clip support comprises a hypo-needle.
73. A method of connecting tissue comprising:  
penetrating a self-closing clip support through first and second portions of material wherein at least one of said portions comprises tissue;  
extending a portion of a self-closing clip from said clip support; and  
simultaneously withdrawing said clip support from said material and allowing said self-closing clip to be discharged therefrom.
74. A method of connecting tissue comprising:  
penetrating a self-closing clip support through first and second portions of material wherein at least one of said portions comprises tissue;  
extending a portion of a self-closing clip, having a memory set closed

1. (Currently amended) Heart valve prosthesis for placement in a valve of a patient's heart, said valve prosthesis comprising a surgical implant including a curved member and a skirt, said curved member having first and second ends and being adapted to form a partial ring along a portion of one of the valve annulae in the patient's heart, and said skirt extending along said curved member and depending therefrom, further including a plurality of struts extending radially inward from said curved member, said struts being unattached to said skirt and being positioned on one side thereof so that said skirt can move away from the struts during diastole.
2. (Original) The prosthesis of claim 1 wherein said curved member is flexible.
3. (Original) The prosthesis of claim 1 wherein said curved member is rigid.
5. (Original) The prosthesis of claim 4 wherein said struts are integrally formed with said curved member.
6. (Original) The prosthesis of claim 4 wherein said skirt has an inner perimeter and said struts terminate before said inner perimeter.
7. (Original) The prosthesis of claim 1 wherein said skirt comprises prosthetic tissue.
8. (Original) The prosthesis of claim 1 wherein said skirt comprises ePTFE.
9. (Original) The prosthesis of claim 1 further including fibrous mesh surrounding said curved member.
10. (Currently amended) Heart valve prosthesis for placement in a valve of a patient's heart, said valve prosthesis comprising a surgical implant including a closed ring shaped member and a skirt, said ring shaped member being adapted to form a ring along one of the valve annulae in the patient's heart, and said skirt extending along at

least a portion of said ring shaped member and depending therefrom, further including a plurality of struts extending radially inward from said curved member, said struts being unattached to said skirt and being positioned on one side thereof so that said skirt can move away from the struts during diastole.

11. (Original) The prosthesis of claim 10 wherein said curved member is flexible.
12. (Original) The prosthesis of claim 10 wherein said curved member is rigid.
14. (Currently amended) The prosthesis of claim [[13]] 10 wherein said struts are integrally formed with said ring shaped member.
15. (Currently amended) The prosthesis of claim [[13]] 10 wherein said skirt has an inner perimeter and said struts terminate before said inner perimeter.
16. (Original) The prosthesis of claim 10 wherein said skirt comprises prosthetic tissue.
17. (Original) The prosthesis of claim 10 wherein said skirt comprises ePTFE.
18. (Original) The prosthesis of claim 10 further including fibrous mesh surrounding said ring shaped member.
19. (Currently amended) Heart valve delivery apparatus for placing heart valve prosthesis in a patient's heart, said apparatus comprising:
  - a delivery device comprising a plurality of tube pairs arranged to support said heart valve prosthesis; and

a plurality of self-closing clips, each clip having an open configuration and a closed configuration and first and second piercing ends, each clip being ejectably mounted to one of said tube pairs with a first portion of the clip slidably positioned in one tube of the tube pair and a second portion slidably positioned in the other tube of the tube

pair so that the first clip piercing end can be ejected from said one tube of the tube pair and said second piercing end can be ejected from said other tube of the tube pair, each tube having a slot formed therethrough, each slot extending the entire length of a respective tube and configured to allow at least a portion of a respective clip to be ejected therethrough.

20. (Original) The apparatus of claim 19 further including a plunger, each of said clips being coupled to said plunger.

21. (Original) The apparatus of claim 20 wherein said clips are laterally spaced from one another and arranged for parallel ejection.

22. (Currently amended) Heart valve repair apparatus for placing heart valve prosthesis in a patient's heart, said apparatus comprising:

heart valve prosthesis comprising a prosthetic valve leaflet and a member supporting said leaflet; and

delivery apparatus comprising a support for said valve prosthesis and a plurality of clips ejectably mounted to said delivery apparatus support, each clip having two piercing tips extending into said member supporting said leaflet;

further including a plurality of tube pairs, each clip having a first portion slidably positioned in one tube of a tube pair and a second portion slidably positioned in the other tube of said tube pair, each tube having a slot formed therethrough, each slot extending the entire length of a respective tube and configured to allow at least a portion of a respective clip to be ejected therethrough.

23. (Original) The heart valve repair apparatus of claim 22 further including a plunger, each of said clips being coupled to said plunger.

24. (Original) The heart valve repair apparatus of claim 23 wherein said clips are laterally spaced from one another and arranged for parallel ejection.

25. (Original) The heart valve repair apparatus of claim 22 wherein said clips have an open configuration and a closed loop shaped configuration, said clips being in said open configuration.

27. (Original) A method for delivering heart valve prosthesis comprising:

- providing heart valve prosthesis having a curved member and a skirt extending therefrom and a plurality of self-closing clips, each having two pointed ends, and an open configuration and a closed configuration;
- securing the curved member to said plurality of self-closing clips with the two pointed ends of each clip penetrated into the curved member;
- placing the curved member on the mitral valve annulus of a patient's heart;
- ejecting all of the clips simultaneously to penetrate into the mitral valve annulus and move toward their closed configuration to secure the heart valve prosthesis to the valve annulus.

28. (Currently amended) The method of claim 27 wherein the heart valve prosthesis has a plurality of struts extending radially inward from said curved member, said struts being unattached to said skirt and being positioned on one side thereof so that said skirt can move away from the struts during diastole.

29. (Original) The method of claim 27 wherein said curved member forms a partial ring which is placed along the posterior portion of the mitral valve annulus with the skirt extending over the mitral valve posterior leaflet.

30. (Currently amended) The method of claim 27 wherein said curved member forms a [[closed]] ring which is arranged so that the skirt extends over the mitral valve posterior leaflet.

31. (Original) The method of claim 27 wherein said curved member is flexible.

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE |

Response to Requirement for Information in Application 10/653,027  
Pending Claims from Application No. 10/814,854  
Atty. Docket No. 22003.00

32. (Original) The method of claim 27 wherein said curved member is rigid.

We claim:

1. An annuloplasty system for repairing a valve in a patient's heart, said annuloplasty system comprising a surgical implant having first and second ends, first and second anchors, and a needle, said implant having a plurality of curves pre-formed therein and being adapted to form a partial ring along a portion of one of the valve annulae of a patient's heart, said annuloplasty system having a first state for placing said implant along said portion of one of the valve annulae and a second state for securing said implant to said portion of one of the valve annulae with said anchors; when said annuloplasty system is in said first state, each one of said anchors is coupled to a different one of said implant ends with at least one of said anchors being exposed, said implant ends are uncoupled from one another, and said needle is releasably coupled to one of said implant ends; and when said annuloplasty system is in said second state, said implant ends remain uncoupled from one another and said needle is uncoupled from said one of said implant ends.
2. The annuloplasty system of claim 1 wherein said implant comprises a member that is axially elastic.
3. The annuloplasty system of claim 1 wherein said implant comprises a wire having an undulating memory configuration.
4. The annuloplasty system of claim 1 wherein said implant comprises a wire formed with a plurality of loops between said end portions and at least one of said anchors comprises a surgical fastener.

23. (New) Apparatus for minimally invasive valve repair, the apparatus comprising:

- a tissue penetrating needle, a flexible member, and a clip, the tissue penetrating needle being connected through the flexible member to the clip, the clip having two end points which are separated from each other when the clip is in an open configuration and tending to return to a naturally closed configuration by reducing distance between the end points when in the open configuration; and
- a needle holder including an outer tube and an inner member which has a front end adapted to grab the needle and is slidable inside the outer tube.

24. (New) Apparatus for minimally invasive valve repair, the apparatus comprising:

- a first and second needle;
- a first and second flexible member;
- a clip having an open configuration and a closed configuration, the clip having a first and second end point, the first needle being connected through the first flexible member to the first end point and the second needle being connected through the second flexible member to the second end point; and
- a first and second release mechanism, wherein the first release mechanism releasably connects the first flexible member to the first end point and the second release mechanism releasably connects the second flexible member to the second end point.

25. (New) The apparatus of claim 24 wherein the clip is generally U-shaped when in the open configuration.

26. (New) The apparatus of claim 24 wherein the clip comprises a wire made of shape memory material.

27. (New) The apparatus of claim 24 wherein the clip in the closed configuration is looped by more than 360°.

28. (New) Apparatus for minimally invasive valve repair, the apparatus comprising:

a tissue penetrating needle, a flexible member, and a clip, the tissue penetrating needle being connected through the flexible member to the clip, the clip having two end points which are separated from each other when the clip is in an open configuration and tending to return to a naturally closed configuration by reducing distance between the end points when in the open configuration; and

a needle holder including an outer tube and an inner member which has a front end adapted to grab the needle and is slidable inside the outer tube, the needle holder further including a spring which is disposed inside the outer tube and serves to apply a biasing force on the inner member backward away from the front end.

29. (New) The apparatus of claim 28 wherein the front end of the inner member has a slit for accepting and grabbing the needle therein.

30. (New) The apparatus of claim 29 wherein the outer tube, the inner member and the slit are designed such that the slit opens wide enough to accept the needle therein and to release the needle therefrom when the inner member is pushed forward against the biasing force and the slit becomes narrower and firmly grips the needle therein when the inner member is moved backward.

31. (New) The apparatus of claim 28 wherein the clip is generally U-shaped when in the open configuration.

32. (New) The apparatus of claim 28 wherein the clip comprises a wire made of shape memory material.

33. (New) The apparatus of claim 28 including a second needle and a second flexible member coupled to the second needle, wherein each flexible member is connected to one of the two end points of the clip.

34. (New) The apparatus of claim 33 including a pair of release mechanisms to releasably connect the flexible members to the clip.

35. (New) Apparatus for minimally invasive valve repair, the apparatus comprising:

a tissue penetrating needle, a flexible member, and a clip, the tissue penetrating needle being connected through the flexible member to the clip, the clip having two end points which are separated from each other when the clip is in an open configuration and tending to return to a naturally closed configuration by reducing distance between the end points when in the open configuration, wherein the clip in the closed configuration is looped by more than 360°; and

a needle holder including an outer tube and an inner member which has a front end adapted to grab the needle and is slidable inside the outer tube.

36. (New) The apparatus of claim 35 wherein the needle holder further includes a spring which is disposed inside the outer tube and serves to apply a biasing force on the inner member backward away from the front end.

37. (New) The apparatus of claim 36 wherein the front end of the inner member has a slit for accepting and grabbing the needle therein.

38. (New) The apparatus of claim 37 wherein the outer tube, the inner member and the slit are designed such that the slit opens wide enough to accept the needle therein and to release the needle therefrom when the inner member is pushed forward against the biasing force and the slit becomes narrower and firmly grips the needle therein when the inner member is moved backward.

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE

Response to Requirement for Information in Application 10/653,027  
Pending Claims from Application No. 11/007,825  
Atty. Docket No. 21779.03

39. (New) The apparatus of claim 35 wherein the clip is generally U-shaped when in the open configuration.

40. (New) The apparatus of claim 35 wherein the clip comprises a wire made of shape memory material.

41. (New) The apparatus of claim 35 including a second needle and a second flexible member coupled to the second needle, wherein each flexible member is connected to one of the two end points of the clip.

42. (New) The apparatus of claim 41 including a pair of release mechanisms to releasably connect the flexible members to the clip.

We claim:

1. An apparatus for fastening a tissue comprising a stopper, where said stopper includes one or more distal members, and a plurality of proximal member flexibly attached to said stopper, where said clip has a fastened configuration in which said plurality of proximal members oppose at least a portion of said stopper, and an open configuration where said clip is openly restrained from said fastened configuration to accept a tissue, such that tissue positioned within said open configuration is compressed when said fastener is unrestrained.  
5
2. The apparatus of claim 1, said plurality of proximal members is two proximal

27. (Previously presented) A method for connecting multiple portions of material, at least one of which comprises tissue, comprising:

threading a fastener, which is biased away from a closed configuration to an open configuration, through a predetermined number of stitches through said multiple portions of material, at least one of which comprises tissue;

mechanically maintaining said fastener in said open configuration while inserting said fastener through said materials; and

allowing said fastener to return to said closed configuration and secure a portion of said material therein with said predetermined stitches.

28. (Previously presented) The method of claim 27 including maintaining said fastener in said open configuration with a locking device.

29. (Previously presented) The method of claim 27 wherein said fastener is allowed to return to said closed configuration by disengaging said locking device.

30. (Previously presented) The method of claim 29 wherein said fastener includes a needle coupled to said locking device and said locking device is disengaged by decoupling said needle from said locking device.

31. (Previously presented) The method of claim 27 further comprising spring biasing said fastener to said open configuration.

32. (Previously presented) The method of claim 27 wherein said fastener is inserted through a layer of tissue and a layer of graft material.

Please add the following new claims:

33. (New) A method for connecting multiple portions of material, at least one of which comprises tissue, comprising:

threading a fastener having a first needle attached to a first end portion of the fastener, a second needle attached to a second end portion of the fastener and a restraining device coupled to the fastener for restraining the fastener towards an open configuration, through a predetermined number of stitches through the multiple portions of material, at least one of which comprises tissue;

restraining the fastener towards the open configuration while inserting the fastener through the material; and

allowing the fastener to return to a closed configuration and secure a portion of the material therein with the predetermined stitches.

34. (New) The method of claim 33 including maintaining the fastener in the open configuration with a locking device.

35. (New) The method of claim 34 wherein the fastener is allowed to return to the closed configuration by disengaging the locking device.

36. (New) The method of claim 33 wherein the first or second needle is coupled to the restraining device and the restraining device is disengaged by decoupling the coupled needle from the restraining device.

37. (New) The method of claim 33 further comprising spring biasing the fastener to the open configuration.

38. (New) The method of claim 33 wherein the fastener is inserted through a layer of tissue and a layer of graft material.

39. (New) A method for connecting multiple portions of material, at least one of which comprises tissue, comprising:

providing a fastener having a restraining device coupled to the fastener for restraining the fastener towards an open configuration, wherein the restraining device comprises a lock assembly engaging a coil surrounding at least a portion of the fastener, wherein engagement of the lock with the coil biases the fastener in the open configuration;

threading the fastener through a predetermined number of stitches through the multiple portions of material, at least one of which comprises tissue;

restraining the fastener towards the open configuration while inserting the fastener through the material; and

allowing the fastener to return to a closed configuration and secure a portion of the material therein with the predetermined stitches.

40. (New) The method of claim 39 wherein the fastener is allowed to return to the closed configuration by disengaging the lock assembly.

41. (New) The method of claim 39 wherein a needle is coupled to the restraining device and the restraining device is disengaged by decoupling the coupled needle from the restraining device.

42. (New) The method of claim 39 wherein the fastener is inserted through a layer of tissue and a layer of graft material.

Claims 1-38 (canceled)

39. (previously presented) A method for connecting a graft vessel to a target vessel in an anastomosis comprising:

inserting a tissue connector assembly through said graft and target vessels with said graft vessel being spaced from said target vessel and said tissue connector assembly having a first end extending from an exterior surface of said graft vessel and a second end extending from an exterior surface of said target vessel; and

pulling at least a portion of said tissue connector assembly to draw said graft vessel into contact with said target vessel.

40. (previously presented) The method of claim 39 further comprising inserting a second tissue connector assembly through said graft and target vessels prior to pulling at least a portion of said tissue connector assembly.

41. (previously presented) The method of claim 39 further comprising inserting a plurality of clips into said graft and target vessels after pulling at least a portion of said tissue connector assembly, to sealingly engage said vessels.

42. (previously presented) The method of claim 41 further comprising placing said clips into an open configuration prior to inserting said clips into said vessels.

43. (previously presented) The method of claim 42 wherein said deforming of said clips includes attaching a restraining device to each of said clips.

44. (previously presented) The method of claim 39 wherein said inserting a tissue connector assembly includes inserting said tissue connector assembly through an end margin of said graft vessel and a side of said target vessel.
45. (previously presented) The method of claim 39 wherein said inserting a tissue connector assembly includes inserting said tissue connector assembly through an end margin of said graft vessel and an end margin of said target vessel.
46. (previously presented) The method of claim 39 wherein said inserting a tissue connector assembly includes inserting said tissue connector assembly through said a side of said graft vessel and a side of said target vessel.

41. (new) A method of anastomosing a first tubular structure having an end portion to a second tubular structure having an opening formed therein where at least one of the structures comprises tissue, the method comprising:

everting the end portion of the first tubular structure over a support device including a plurality of arms, each having a proximal end and a distal end;

positioning the support device so that a portion of the first tubular structure forms a seal with a portion of the second tubular structure surrounding the opening therein;

passing a plurality of fasteners between selected arms and through the tubular structures in the vicinity of the opening to secure the tubular structures together; and

removing the support member from the tubular structures.

42. (new) The method of claim 41 wherein the support device is positioned within the opening formed in the second tubular structure.

43. (new) The method of claim 41 wherein the support device is positioned so that at least a portion of the everted end portion of the first tubular structure forms a seal with the portion of the second tubular structure surrounding the opening therein.

44. (new) The method of claim 41 wherein passing surgical fasteners between selected arms and through the tubular structures comprises passing sutures between selected arm and through the tubular structures to secure the structures together.

45. (new) The method of claim 41 wherein passing surgical fasteners between selected arms and through the tubular structures comprises passing surgical clips between selected arms and through the tubular structures to secure the structures together.

46. (new) The method of claim 41 wherein passing surgical fasteners between selected arms and through the tubular structures comprises passing self-closing surgical clips through the spaces and the tubular structures to secure the structures together.

47. (new) A method of anastomosing a first tubular structure having an end portion to a second tubular structure having an opening formed therein, where at least one of the structures is tissue, the method comprising:

providing a support device including a plurality of arms having a proximal end, a distal end, and a plurality of piercing members extending therefrom;

securing the first tubular structure to the plurality of piercing members;

positioning the support device so that the tubular structures contact one another;

passing a plurality of surgical fasteners between selected arms of the support device and through the tubular structures to secure the tubular structures together; and

removing the support device from the tubular structures.

48. (new) The method of claim 47 wherein the support member is positioned to form a seal between the tubular structures in the region adjacent the opening in the second tubular structure.

49. (new) The method of claim 47 wherein the end portion of the first tubular structure is everted over the distal ends of the arms and the support device is positioned to form a seal between at least a portion of the everted portion of the first and second tubular structures in the vicinity of the opening.

50. (new) The method of claim 47 wherein a portion of the support device is introduced through the opening in the second tubular structure and positioned therein.

51. (new) The method of claim 47 wherein passing surgical fasteners between selected arms and the tubular structures comprises passing sutures between selected arms and the tubular structures to secure the structures together.

52. (new) The method of claim 47 wherein passing surgical fasteners between selected arms and through the tubular structures comprises passing surgical clips between selected arms and through the tubular structures to secure the structures together.

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE

Response to Requirement for Information in Application 10/653,027  
Pending Claims from Application No. 11/643,322  
Atty. Docket No. 21914.06

53. (new) The method of claim 47 wherein passing surgical fasteners between selected arms and through the tubular structures comprises passing self-closing surgical clips between selected arms and through the tubular structures to secure the structures together.

54. (new) The method of claim 47 including moving the arms radially inward and introducing the distal ends of the support device arms into the opening in the second tubular structure.

55. (new) The method of claim 54 including radially expanding the support device arms after introducing the distal ends of the arms into the opening in the second tubular structure.

56. (new) The method of claim 47 wherein positioning the distal ends of the support device arms includes introducing the distal ends of the arms into the opening in the second tubular structure and radially expanding the arms from a first state to a second state so that a portion of the first tubular structure is forced against the region of the second tubular structure that surrounds the opening.

57. (new) The method of claim 56 wherein the support device arms are returned to the first state before removing the support device from the tubular structures.

58. (new) A method of anastomosing a first tubular structure having an end portion to a second tubular structure having an opening formed therein, where at least one of the structures is tissue, the method comprising:

providing a support device including a plurality of arms having a proximal end, a distal end, and a plurality of piercing members having a first deformed shape and a second looped memory shape;

securing the first tubular structure to the plurality of piercing members;

securing the second tubular structure to the plurality of piercing members; and

removing the support device from said piercing members and allowing the piercing members to return to their second memory loop shape.

59. (new) A method of anastomosing a first tubular structure, having an end portion, to a second tubular structure, having fluid flowing therethrough, comprising:

forming an opening in the second tubular structure, while maintaining fluid flow therethrough;

placing the end portion of the first tubular structure in the opening in the second tubular structure such that a seal is formed between the first tubular structure and the second tubular structure, while maintaining fluid flow through the first tubular structure, and

securing the first tubular structure to the second tubular structure with fasteners.

60. (new) The method of claim 59 wherein the first tubular structure is a graft and the second tubular structure is a vessel.

61. (new) The method of claim 59 wherein the second tubular structure is an aorta.

62. (new) The method of claim 59 wherein blood is flowing through the second tubular structure.

63. (new) A method of anastomosing a first tubular structure, having an end portion, to a second tubular structure, having fluid flowing therethrough, comprising:

placing the end portion of the first tubular structure in an opening formed in the second tubular structure such that a seal is formed between the first tubular structure and the second tubular structure;

securing the first tubular structure to the second tubular structure with fasteners; and

performing the foregoing steps without clamping the second tubular structure to interrupt fluid flow therethrough.

64. (new) The method of claim 63 wherein the first tubular structure is a graft and the second tubular structure is a vessel.

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE |

Response to Requirement for Information in Application 10/653,027  
Pending Claims from Application No. 11/643,322  
Atty. Docket No. 21914.06

65. (new) The method of claim 63 wherein the second tubular structure is an aorta.
66. (new) The method of claim 63 wherein blood is flowing through the second tubular structure.

WHAT IS CLAIMED IS:

1. A surgical clip comprising an elongated member and a pair of biasing mechanisms coupled to said member, said elongated member comprising shape memory material and having a memory set closed configuration from which it is moveable to a plurality of open configurations, said biasing mechanisms being selectively adjustable to bias the clip toward any of said plurality of open configurations, each biasing mechanism comprising a biasing member and an actuator, each biasing member adapted to apply a biasing force to said elongated member to urge said elongated member away from said closed configuration, and each actuator being coupled to one of said biasing members and adapted to activate said biasing member to apply said biasing force to said elongated member.
2. The surgical clip of claim 1 wherein each biasing mechanism comprises a coil and a sliding member, each coil surrounding a portion of said elongated member and each sliding member being slidably mounted to said elongated member to slidably engage one of said coils.
3. The surgical clip of claim 2 wherein each sliding member comprises a disk having an opening formed therethrough, said elongated member extending through each opening.
4. The surgical clip as in any one of claims 1-3 wherein said elongated member has two ends and said ends form enlarged portions of said clip.
5. The surgical clip of claim 4 further including tissue piercing members releasably coupled to enlarged portions.
6. The surgical clip as in any one of claims 1-3 wherein said elongated member has two pointed ends adapted to pierce tissue.
7. The surgical clip as in any one of claims 1-3 wherein said biasing mechanisms are symmetrically arranged about said elongated member.

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE !

8. The surgical clip of claim 7 wherein said elongated member has two ends and said ends form enlarged portions of said clip.

9. The surgical clip of claim 8 further including tissue piercing members releasably coupled to said enlarged portions.

10. A surgical clip comprising an elongated member and a pair of biasing mechanisms coupled to said member, said elongated member comprising shape memory material and having a memory set closed configuration from which it is moveable to a plurality of open configurations, said biasing mechanisms being selectively adjustable to bias the clip toward any of said plurality of open configurations, said elongated member further having two tissue piercing members secured to and engaging said elongated member and extending therefrom.

11. The surgical clip of claim 10 wherein said piercing members are releasably secured to said elongated member.

12. The surgical clip of claim 11 wherein said biasing mechanisms are symmetrically arranged about said elongated member.

13. The surgical clip of claim 10 wherein said biasing mechanisms are symmetrically arranged about said elongated member.

14. A surgical clip comprising an elongated member and a pair of biasing mechanisms coupled to said member, said elongated member comprising shape memory material and having a memory set closed configuration from which it is moveable to a plurality of open configurations, said biasing mechanisms being selectively adjustable to bias the clip toward any of said plurality of open configurations, said elongated member further having two tissue piercing members integrally formed therewith.

15. The surgical clip of claim 14 wherein said biasing mechanisms are symmetrically arranged about said elongated member.

16. Surgical clip delivery apparatus for delivering a surgical clip as described in claim 1, said apparatus comprising:

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE

a body member having an opening adapted to allow said surgical clip to pass therethrough for release thereof;

a clip holder disposed in said body member and adapted to releasably hold said surgical clip; and

a controller having multiple actuator engaging surfaces disposed in said body member, said multiple surfaces configured to engage said clip actuators to adjust the force that the biasing member applies to said clip.

17. The apparatus of claim 16 wherein said controller has a slot formed therein which is adapted to receive said elongated member.

18. The apparatus of claim 17 wherein said controller slot is arranged so that said actuators engage at least two of said engaging surfaces when the elongated member of said surgical clip is positioned in said slot.

19. The apparatus of claim 18 wherein said body member has a distal end and a proximal end and said body member opening comprises a slot, which is formed in said body member and extends from said distal end, said body slot being aligned with said controller slot.

20. The apparatus of claim 16 wherein said engaging surfaces include sloped surfaces.

21. The apparatus of claim 20 wherein said engaging surfaces further include parallel surfaces.

22. The apparatus of claim 16 further including tissue piercing member removal mechanisms coupled to said body member, said tissue piercing removal mechanisms having portions adapted to capture tissue piercing members when coupled to said clip.

23. A surgical system for closing an opening in tissue comprising:

a self-closing clip as described in claim 1;

a body member having an opening adapted to allow said surgical clip to pass therethrough for release thereof;

THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE

a clip holder disposed in said body member and adapted to releasably hold said surgical clip; and

a controller having multiple actuator engaging surfaces disposed in said body member, said multiple surfaces configured to engage said clip actuators to adjust the force that the biasing member applies to said clip.

24. The system of claim 23 wherein said controller has a slot formed therein which is adapted to receive said elongated member.

25. The system of claim 24 wherein said controller slot is arranged so that said actuators engage at least two of said engaging surfaces when the elongated member of said surgical clip is positioned in said slot.

26. The system of claim 25 wherein said body member has a distal end and a proximal end and said body member opening comprises a slot, which is formed in said body member and extends from said distal end, said body slot being aligned with said controller slot.

27. The system of claim 23 wherein said engaging surfaces include sloped surfaces.

28. The system of claim 27 wherein said engaging surfaces further include parallel surfaces.

29. The system of claim 27 further including tissue piercing member removal mechanisms coupled to said body member, said tissue piercing removal mechanisms having portions adapted to capture tissue piercing members when coupled to said clip.

30. A surgical system for closing an opening in tissue comprising:  
an elongated body member having a proximal end and a distal end adapted for introduction into a tissue opening, said elongated body member further having an opening therein; and

a surgical clip having ends, an open configuration and a closed configuration, said surgical clip being releasably coupled to said elongated body member and arranged so that when in said open configuration said clip ends extend from said elongated body member opening at diametrically opposed portions of said body member and generally

**THIS CLAIM SET IS NOT AN AMENDMENT  
FOR ENTRY IN THIS CASE**

point toward the proximal end of said body member so that when said body member is introduced into the tissue opening and the surgical clip moved to said open configuration, the ends of said surgical clip can penetrate the tissue adjacent the opening therein when the body member is retracted.

31. A method for closing an opening in tissue having an outer surface and an inner surface comprising:

introducing a self-closing clip, which has ends, an open configuration and a memory set closed configuration, through the opening;

positioning the self-closing clip in an open configuration with said ends directed toward the inner surface of the tissue;

passing said ends through the tissue adjacent to the opening;

closing the opening; and

allowing the self-closing clip to return toward its closed configuration.

32. The method of claim 31 wherein the tissue edges surrounding the opening are moved along the clip to close the opening.

33. The method of claim 31 wherein said opening is in an artery.

34. The method of claim 31 wherein said opening is in a femoral artery.

35. The method of claim 31 wherein said opening is in an aorta.

36. The method of claim 31 wherein a sleeve is positioned in said opening and said clip is introduced through said sleeve.

37. The method of claim 31 wherein a cannula is positioned in said opening and said clip is introduced through said cannula.

38. The method of claim 31 wherein an introducer sheath is positioned in said opening and said clip is introduced through said introducer sheath.